* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The motor made to rotate an optical disk and the optical head which irradiates a laser beam on the front face of said optical disk, The stage where holds said optical head and it moves, and the encoder which detects the revolution information on said motor, In the marking equipment for optical disks equipped with the stage control section which controls the actuator of said stage based on the detection result of said encoder, and the motor control section which controls said motor A location radial [on said optical disk stamped by said optical head based on said revolution information outputted from said encoder] and the location of a circumferencial direction are computed. Marking equipment for optical disks characterized by preparing the laser control section which controls the output of said optical head according to a location radial [said] and the location of said circumferencial direction in addition to marking data.
[Claim 2] Said laser control section is marking equipment for optical disks according to claim 1 characterized by inputting the marking data edited with the graphic form editor, exposure power setting-out data, and pit width-of-face amendment data, and controlling the output of said optical head.
[Claim 3] The pit width-of-face amendment memory which memorizes the information which amends the pit width of face of the pit where said laser control section is exposed by said optical head, The image memory which memorizes the image information to stamp, and the power control memory which memorizes the information about the exposure power for every pit, The counter which controls each address of said pit width-of-face amendment memory, said image memory, and said power control memory based on the detecting signal of said encoder, The amendment section which amends the data of said image memory and said power control memory based on the data stored in said pit width-of-face amendment memory, Marking equipment for optical disks according to claim 1 characterized by having the laser section which controls the output of said optical head based on the data from said image memory, and the data from said power control memory.
[Claim 4] Said graphic form editor is marking equipment for optical disks according to claim 1 characterized by inputting the pattern of standard alphabetic data, such as an alphabetic character generated in the alphabetic data generation section, and the marking pattern generated in the image data generation section based on the content of the standard image files, such as a bit map and an icon.
[Claim 5] Said optical head is marking equipment for optical disks according to claim 1 characterized by being controlled by the focal control section which adjusts the diameter of a spot of a laser beam according to the location on said optical disk.

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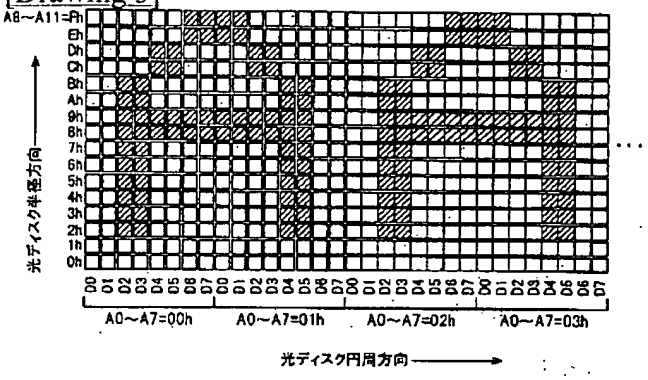
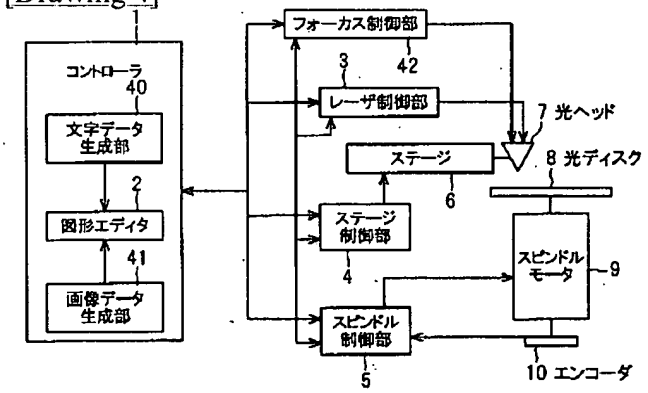
DRAWINGS

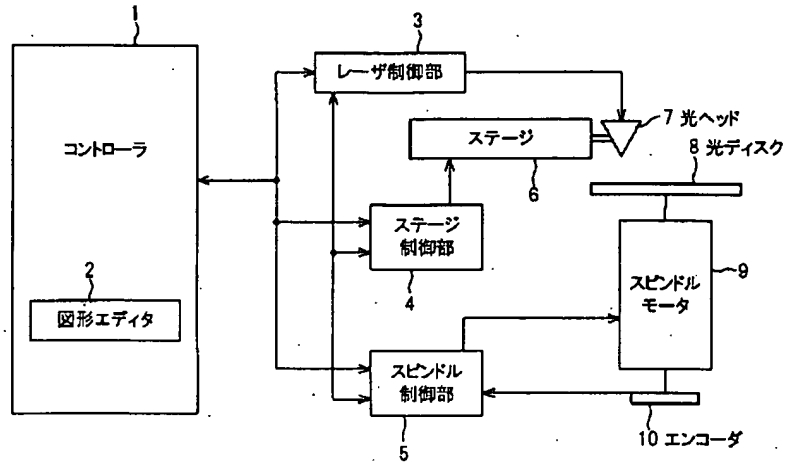
[Drawing 3]



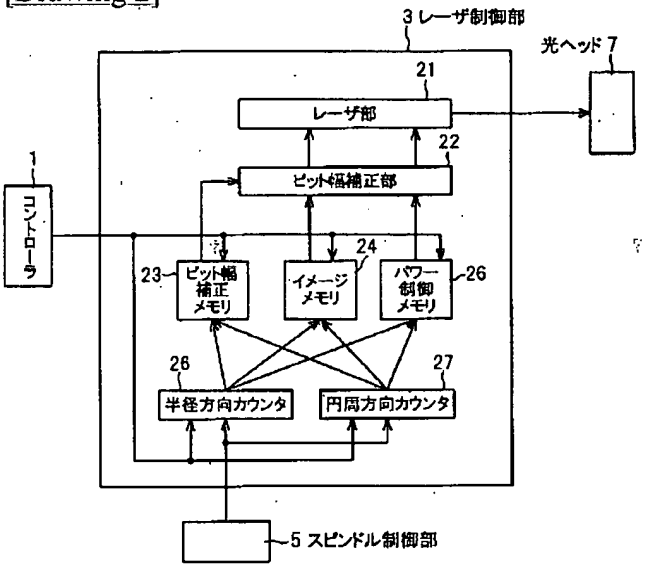
[Drawing 4]



[Drawing 1]



[Drawing 2]



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the marking equipment for optical disks on which it enables it to stamp especially arbitration which can be viewed to an optical disk side using laser about the marking equipment for optical disks.
[0002]
[Description of the Prior Art] An optical disk is the record medium which can record data on a recording surface by irradiating laser spot light. Although there are a magneto-optic disk, a phase change record optical disk, a write-once mold optical disk, etc. as this optical disk, all are recording by irradiating laser spot light. Since it does not change a configuration even if an optical disk changes an application, it needs to enable it to judge an application clearly. Then, printing and marking that a user views and understands an application (class), a manufacturer name, and the information on other on the surface of a disk are performed. Printing is performed by the approach of carrying out the regurgitation of the ink droplet corresponding to an alphabetic character etc. to a disk side by the ink jet. Moreover, as for marking, the approach of processing in the condition that it is made to change selectively and people can recognize by the eye is used in the reflection factor on the front face of a disk by the exposure of a laser spot.
[0003] Since it becomes an increase of a process to establish a marking process separately when stamping on the surface of an optical disk (or printing), the approach of enforcing simultaneously, when performing initialization of a disk etc. is proposed by JP,9-306144,A. The optical head which the marking equipment for attaining this marking approach moves with carriage, The rotary encoder which detects the spindle motor which carries out revolution actuation of the optical disk, the signal for every revolution of this spindle motor, and the signal according to an angle of rotation, The spindle control section which controls said spindle motor, the carriage control section which controls the drive motor of carriage, At the time of data elimination, it has the laser output-control section which controls the output of the laser component of an optical head, and the microprocessor which has a transliteration function at the time of initialization of record film, and printing, and is constituted at it. A microprocessor determines a truck, exposure timing, etc. which are stamped based on the output of printing information, such as an alphabetic character, size, and a marking location, and a rotary encoder using the transliteration function by software, and the laser output-control section carries out laser radiation of the predetermined reinforcement by the laser spot width of face for every truck according to the contents of marking, such as an alphabetic character, based on this result. In that case, a carriage control section moves an optical head based on the output of a rotary encoder so that the next laser radiation may not lap with the last irradiated part.
[0004]
[Problem(s) to be Solved by the Invention] However, according to the conventional marking equipment for optical disks, since marking data are generated by software using a microprocessor, it is difficult [it] to gather the generation speed of said marking data. For this reason, since the output frequency of a

rotary encoder is not raised, with marking which performs laser exposure synchronizing with an encoder output, size of a pit cannot be made small and a fine pattern cannot be stamped. Moreover, since the marking pattern which prepared the shade cannot be expressed, large marking of visual effectiveness is not made.

[0005] Therefore, the object of this invention can perform processing for marking by hardware, can do marking of a fine pattern, and is about a marking pattern to offer the marking equipment for optical disks which can be expressed by the shade.

[0006]

[Means for Solving the Problem] The motor made to rotate an optical disk in order that this invention may attain the above-mentioned object, The stage which holds the optical head which irradiates a laser beam, and said optical head on the front face of said optical disk, and is moved to it, In the marking equipment for optical disks equipped with the encoder which detects the revolution information on said motor, the stage control section which controls the actuator of said stage based on the detection result of said encoder, and the motor control section which controls said motor A location radial [on said optical disk stamped by said optical head based on said revolution information outputted from said encoder] and the location of a circumferencial direction are computed. The marking equipment for optical disks characterized by preparing the laser control section which controls the output of said optical head according to a location radial [said] and the location of said circumferencial direction in addition to marking data is offered.

[0007] According to this configuration, based on the revolution information on the drive motor outputted from an encoder, a location radial [on an optical disk] and the location of a circumferencial direction are computed, and the output of an optical head is controlled based on this location calculation result. Fine marking can be performed now, as a result of being able to gather the generation speed of marking data and being able to make size of a pit small, since correction (amendment) of the marking data which drive an optical head is made by hardware. Moreover, marking with a shade is attained by controlling exposure power.

[0008]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained based on a drawing.

(Gestalt of the 1st operation) Drawing 1 shows the marking equipment for optical disks of this invention. The marking equipment for optical disks of this invention is formed in a controller 1 and this controller 1, and contains the graphic form editor 2 equipped with the function to edit marking data, exposure power setting-out data, and pit width-of-face amendment data. The laser control section 3, the stage control section 4, and the spindle control section 5 are connected to the controller 1. The actuator (un-illustrating) of a stage 6 is connected to the stage control section 4. This stage 6 carries the optical head 7 which outputs a laser beam (exposure beam). The optical head 7 builds the laser component (un-illustrating) for irradiating a laser beam in an optical disk 8, and this invention besides initialization of an optical disk 8 and the writing of data performs the target marking. An optical disk 8 rotates a spindle motor 9 as a driving source, it is equipped with the encoder 10 for detecting a revolution of a spindle motor 9, and the optical head 7 is positioned above the optical disk 8. The detecting signal by the encoder 10 is incorporated by the spindle control section 5.

[0009] In the configuration of drawing 1 , the graphic form editor 2 edits marking images (an alphabetic character, a figure, a notation, illustration, etc.), and also edits the pit width-of-face amendment data and exposure power data corresponding to each part of a marking image. by make the exposure time of the laser beam by the optical head 7 shorten or increase , and amend pit width of face , pit width of face amendment be express by the configuration with the notation of O mark exact in the ability of the amount of [, such as a dip part of an alphabetic character ,] line part stamp smoothly etc. , or its repeatability , such as an alphabetic character by the combination of a thick line and a thin line , improve like the kanji . Moreover, edit of exposure power data is edit to which the laser output (exposure power) of the optical head 7 is made to reduce or increase, and can make the multiple-value image which has a shade in marking generate by changing exposure power. Thus, in this invention, marking of the image

which can stamp an alphabetic character etc. finely and has a shade is also attained.
[0010] If the outline of the activation process of marking is explained, first, a marking image will be edited with the graphic form editor 2 of a controller 1, and pit width-of-face amendment data and exposure power data will be edited simultaneously. The pit width-of-face amendment data and exposure power data based on this edit are stored in the memory of assignment of the laser control section 3. Subsequently, a stage 6 is driven and the optical head 7 is moved to the upper part of an optical disk 8. And based on the information edited by the graphic form editor 2, the laser control section 3 is synchronized with the encoder signal of a spindle motor 9, and controls luminescence of the laser written in an optical disk 8. The stage control section 4 moves a stage 6 to the radial outside or the radial inside of an optical disk 8 with progress of writing. After completion of writing, when there is no processing to an optical disk 8 in others, the stage control section 4 evacuates the optical head 7 from on an optical disk 8.
[0011] Drawing 2 shows the detail configuration of the laser control section 3 of drawing 1 . In drawing 2 , the laser control section 3 is equipped with the laser section 21, the pit width-of-face amendment section 22, the pit width-of-face amendment memory 23 that memorizes pit width-of-face amendment information, the image memory 24 which memorizes the image information stamped actually, the power control memory 25 which memorizes the exposure power information doubled with each pit, the radial counter 26, and the circumferencial direction counter 27, and is constituted.
[0012] The laser section 21 is equipped with the function which controls laser power by the data of the power control memory 25 which carried out ON/OFF of the laser with the data of the image memory 24 which let the pit width-of-face amendment section 22 pass, and let the pit width-of-face amendment section 22 pass. The pit width-of-face amendment section 22 makes the data (pulse width) time amount of image memory 24 and the power control memory 25 fluctuate based on the data stored in the pit width-of-face amendment memory 23. The radial counter 26 counts the spindle zero signal from the spindle control section 5, and controls each address of the pit width-of-face amendment memory 23, image memory 24, and the power control memory 25. The circumferencial direction counter 27 counts the spindle revolution signal from the spindle control section 6, and controls each address of the pit width-of-face amendment memory 23, image memory 24, and the power control memory 25. In addition, image memory 24, the power control memory 25, and the pit width-of-face amendment memory 23 shall deal with 12 bits (A0-A11) and data for the address as 8 bits (D0-D7).
[0013] Drawing 3 shows an example of a marking image and a marking result. Here, as an image stamped on an optical disk, "A" of the alphabet is illustrated and the marking result [according / right-hand side / to the optical head 7] according [the left-hand side of drawing 3] to a marking image is shown. Here, if a pit is made into different die length to an adjoining truck, the continuity of a shadow area is raised, and although the marking die length of a circumferencial direction is made to become the same by the marking image and the marking result, fine marking can be performed even if it is a binary expression. Moreover, if a circumferencial direction and radial pit length is fluctuated, zooming of a circumferencial direction is possible.
[0014] Next, with reference to drawing 1 - drawing 3 , actuation of the marking equipment for optical disks of this invention is explained. First, the data of the marking image shown in the left-hand side of drawing 3 and the data of exposure power and pit width-of-face amendment are edited with the graphic form editor 2. Although the information on each dot is specified on the graphic form editor 2, since the radial die length (the number of trucks) of a dot and the die length (the number of encoder pulses from the spindle control section 5) of a circumferencial direction can be specified, amplification and a cutback are easy. A controller 1 writes each data of the marking image edited by the graphic form editor 2, exposure power, and pit width-of-face amendment in each of the image memory 24 of the laser control section 3, the power control memory 25, and the pit width-of-face amendment memory 23. The addresses A0-A7 are made into the circumferencial direction address, the addresses A8-A11 are made into the radial address, and a marking image is assigned to the single address per 8 dots.
[0015] Moreover, a controller 1 sets the counter value for incrementing the radial address of image memory 24, the power control memory 25, and the pit width-of-face amendment memory 23 as the

radial counter 26. This counter value is set up based on the information on the radial die length (the number of trucks) of the dot edited by the graphic form editor 2. Furthermore, a controller 1 sets the counter value for incrementing the circumferencial direction address of image memory 24, the power control memory 25, and the pit width-of-face amendment memory 23 as the circumferencial direction counter 27. This counter value is set up based on the information on the die length (pulse number detected with the encoder 10) of the circumferencial direction edited by the graphic form editor 2.

[0016] Moreover, a controller 1 initializes each address of image memory 24, the power control memory 25, and the pit width-of-face amendment memory 23. And a controller 1 takes out a command to the stage control section 4 and the spindle control section 5, and a stage 6 is moved so that the optical head 7 may come on an exposure starting position. Subsequently, a spindle motor 9 is rotated and an optical disk 8 is rotated. Then, a controller 1 outputs an exposure initiation command to the stage control section 4 and the laser control section 3. A stage 6 is gradually moved to radial [of an optical disk 8] with progress of exposure.

[0017] The spindle control section 5 sends out what carried out multiplying of the angle-of-rotation zero pulse (henceforth Z pulse) of a spindle motor 9, and the output pulse of an encoder 10 (henceforth an P-pulse) to the laser control section 3 and the stage control section 4. The stage control section 4 controls a stage 6 based on the pulse from the spindle control section 5, and moves the optical head 7. Thereby, a track pitch is kept constant.

[0018] The radial counter 26 counts Z pulse sent from the spindle control section 5, and if it reaches the number of trucks (radial die length of 1 dot) beforehand set up by the controller 1, it will increment the radial address of image memory 24, the power control memory 25, and the pit width-of-face amendment memory 23. Moreover, the circumferencial direction counter 27 counts P pulse sent from the spindle control section 5, and if it reaches the number of encoder pulses (die length of 1 dot of a circumferencial direction) beforehand set up by the controller 1, it will increment the circumferencial direction address of image memory 24, the power control memory 25, and the pit width-of-face amendment memory 23. Thus, when the radial counter 26 and the circumferencial direction counter 27 operate, corresponding to the location of the optical head 7 on an optical disk 8, exact data are outputted to the pit width-of-face amendment section 22 from image memory 24, the power control memory 25, and the pit width-of-face amendment memory 23.

[0019] The pit width-of-face amendment section 22 adjusts the output data (time amount, pulse width) of image memory 24 and the power control memory 25 according to the output data from the pit width-of-face amendment memory 23. There is the approach of compounding the signal which delayed the original signal and the signal of the origin of this by the delay line etc. by the AND circuit or the OR circuit as one of the adjustment approach of that, and shortening the original signal, or lengthening. The laser section 21 carries out ON/OFF control of the laser oscillation according to the data from the image memory 24 which let the pit width-of-face amendment section 22 pass. Moreover, the laser section 21 adjusts laser power according to the output data of the power control memory 25 which let the pit width-of-face amendment section 22 pass. Marking with a shade is performed by accommodation of laser power.

[0020] (Gestalt of the 2nd operation) Drawing 4 shows the gestalt of other operations of the marking equipment for optical disks of this invention. In drawing 4 , since the same citation figure was used for the same thing with having been shown in drawing 1 , the explanation which overlaps below is omitted. In the marking equipment for optical disks of drawing 4 , the alphabetic data generation section 40 and the image data generation section 41 were formed in the controller 1, and the focal control section 42 is further formed in the laser control section 3 and juxtaposition. Thereby, relief of the burden of edit of the marking pattern by the graphic form editor 2 is in drawing. The alphabetic data generation section 40 generates the pattern of standard alphabetic data, such as an alphabetic character, and sends this out to the graphic form editor 2. Thereby, the burden of marking pattern edit is mitigated. Moreover, the image data generation section 41 changes the content of the standard image files, such as a bit map and an icon, into a marking pattern, and sends this out to the graphic form editor 2. Thereby, the burden of marking pattern edit is mitigated.

[0021] The focal control section 42 builds in the counter and memory which count the detection pulse of an encoder 10 like the laser control section 3. And it has the function to adjust the diameter of a spot of an exposure beam (laser beam) according to the location of the optical head 7 on an optical disk 8. When stamping the rough pattern which is not thereby not much fine, focal control is performed and the diameter of the beam spot is enlarged. What is necessary is just to enlarge a laser output, since the exposure power per unit area will become small, if the diameter of the beam spot is enlarged. For this reason, when stamping by carrying out two or more revolutions of the optical disk 8, the turnover number of a spindle motor 9 can be reduced and, thereby, compaction of the exposure time can be aimed at.

[0022]

[Effect of the Invention] According to the marking equipment for optical disks of this invention, a location radial [on the optical disk stamped by the optical head based on the revolution information outputted from an encoder] and the location of a circumferencial direction are computed as explained above. Since the laser control section which controls the output of said optical head according to a location radial [said] and the location of said circumferencial direction in addition to marking data was prepared Creation (processing) of the marking data based on hardware control is attained, since the burden of software is mitigated, working speed increases, and it becomes possible to make a pit small, and fine marking can be performed. Moreover, since it can carry out adjustable [of the die length of pit width of face], expanding-and-contracting marking to a circumferencial direction is attained. Furthermore, since the burden of software is mitigated by hardware control, functions, such as a user interface and an error monitor, can be strengthened.

[0023] Moreover, a shade can be expressed in marking by controlling exposure power in the output control of an optical head. Furthermore, by having the editor ability of a marking pattern, zooming of the pattern of not only an alphabetic character but arbitration can be carried out, and it can be stamped.

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[Detailed Description of the Invention]
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[0002]
[Description of the Prior Art] An optical disk is the record medium which can record data on a recording surface by irradiating laser spot light. Although there are a magneto-optic disk, a phase change record optical disk, a write-once mold optical disk, etc. as this optical disk, all are recording by irradiating laser spot light. Since it does not change a configuration even if an optical disk changes an application, it needs to enable it to judge an application clearly. Then, printing and marking that a user views and understands an application (class), a manufacturer name, and the information on other on the surface of a disk are performed. Printing is performed by the approach of carrying out the regurgitation of the ink droplet corresponding to an alphabetic character etc. to a disk side by the ink jet. Moreover, as for marking, the approach of processing in the condition that it is made to change selectively and people can recognize by the eye is used in the reflection factor on the front face of a disk by the exposure of a laser spot.
[0003] Since it becomes an increase of a process to establish a marking process separately when stamping on the surface of an optical disk (or printing), the approach of enforcing simultaneously, when performing initialization of a disk etc. is proposed by JP,9-306144,A. The optical head which the marking equipment for attaining this marking approach moves with carriage, The rotary encoder which detects the spindle motor which carries out revolution actuation of the optical disk, the signal for every revolution of this spindle motor, and the signal according to an angle of rotation, The spindle control section which controls said spindle motor, the carriage control section which controls the drive motor of carriage, At the time of data elimination, it has the laser output-control section which controls the output of the laser component of an optical head, and the microprocessor which has a transliteration function at the time of initialization of record film, and printing, and is constituted at it. A microprocessor determines a truck, exposure timing, etc. which are stamped based on the output of printing information, such as an alphabetic character, size, and a marking location, and a rotary encoder using the transliteration function by software, and the laser output-control section carries out laser radiation of the predetermined reinforcement by the laser spot width of face for every truck according to the contents of marking, such as an alphabetic character, based on this result. In that case, a carriage control section moves an optical head based on the output of a rotary encoder so that the next laser radiation may not lap with the last irradiated part.
[0004]
[Problem(s) to be Solved by the Invention] However, according to the conventional marking equipment for optical disks, since marking data are generated by software using a microprocessor, it is difficult [it] to gather the generation speed of said marking data. For this reason, since the output frequency of a

rotary encoder is not raised, with marking which performs laser exposure synchronizing with an encoder output, size of a pit cannot be made small and a fine pattern cannot be stamped. Moreover, since the marking pattern which prepared the shade cannot be expressed, large marking of visual effectiveness is not made.

[0005] Therefore, the object of this invention can perform processing for marking by hardware, can do marking of a fine pattern, and is about a marking pattern to offer the marking equipment for optical disks which can be expressed by the shade.

[0006]

[Means for Solving the Problem] The motor made to rotate an optical disk in order that this invention may attain the above-mentioned object, The stage which holds the optical head which irradiates a laser beam, and said optical head on the front face of said optical disk, and is moved to it, In the marking equipment for optical disks equipped with the encoder which detects the revolution information on said motor, the stage control section which controls the actuator of said stage based on the detection result of said encoder, and the motor control section which controls said motor A location radial [on said optical disk stamped by said optical head based on said revolution information outputted from said encoder] and the location of a circumferencial direction are computed. The marking equipment for optical disks characterized by preparing the laser control section which controls the output of said optical head according to a location radial [said] and the location of said circumferencial direction in addition to marking data is offered.

[0007] According to this configuration, based on the revolution information on the drive motor outputted from an encoder, a location radial [on an optical disk] and the location of a circumferencial direction are computed, and the output of an optical head is controlled based on this location calculation result. Fine marking can be performed now, as a result of being able to gather the generation speed of marking data and being able to make size of a pit small, since correction (amendment) of the marking data which drive an optical head is made by hardware. Moreover, marking with a shade is attained by controlling exposure power.

[0008]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained based on a drawing.

(Gestalt of the 1st operation) Drawing 1 shows the marking equipment for optical disks of this invention. The marking equipment for optical disks of this invention is formed in a controller 1 and this controller 1, and contains the graphic form editor 2 equipped with the function to edit marking data, exposure power setting-out data, and pit width-of-face amendment data. The laser control section 3, the stage control section 4, and the spindle control section 5 are connected to the controller 1. The actuator (un-illustrating) of a stage 6 is connected to the stage control section 4. This stage 6 carries the optical head 7 which outputs a laser beam (exposure beam). The optical head 7 builds the laser component (un-illustrating) for irradiating a laser beam in an optical disk 8, and this invention besides initialization of an optical disk 8 and the writing of data performs the target marking. An optical disk 8 rotates a spindle motor 9 as a driving source, it is equipped with the encoder 10 for detecting a revolution of a spindle motor 9, and the optical head 7 is positioned above the optical disk 8. The detecting signal by the encoder 10 is incorporated by the spindle control section 5.

[0009] In the configuration of drawing 1 , the graphic form editor 2 edits marking images (an alphabetic character, a figure, a notation, illustration, etc.), and also edits the pit width-of-face amendment data and exposure power data corresponding to each part of a marking image. by make the exposure time of the laser beam by the optical head 7 shorten or increase , and amend pit width of face , pit width of face amendment be express by the configuration with the notation of O mark exact in the ability of the amount of [, such as a dip part of an alphabetic character ,] line part stamp smoothly etc. , or its repeatability , such as an alphabetic character by the combination of a thick line and a thin line , improve like the kanji . Moreover, edit of exposure power data is edit to which the laser output (exposure power) of the optical head 7 is made to reduce or increase, and can make the multiple-value image which has a shade in marking generate by changing exposure power. Thus, in this invention, marking of the image

which can stamp an alphabetic character etc. finely and has a shade is also attained.
[0010] If the outline of the activation process of marking is explained, first, a marking image will be edited with the graphic form editor 2 of a controller 1, and pit width-of-face amendment data and exposure power data will be edited simultaneously. The pit width-of-face amendment data and exposure power data based on this edit are stored in the memory of assignment of the laser control section 3. Subsequently, a stage 6 is driven and the optical head 7 is moved to the upper part of an optical disk 8. And based on the information edited by the graphic form editor 2, the laser control section 3 is synchronized with the encoder signal of a spindle motor 9, and controls luminescence of the laser written in an optical disk 8. The stage control section 4 moves a stage 6 to the radial outside or the radial inside of an optical disk 8 with progress of writing. After completion of writing, when there is no processing to an optical disk 8 in others, the stage control section 4 evacuates the optical head 7 from on an optical disk 8.
[0011] Drawing 2 shows the detail configuration of the laser control section 3 of drawing 1 . In drawing 2 , the laser control section 3 is equipped with the laser section 21, the pit width-of-face amendment section 22, the pit width-of-face amendment memory 23 that memorizes pit width-of-face amendment information, the image memory 24 which memorizes the image information stamped actually, the power control memory 25 which memorizes the exposure power information doubled with each pit, the radial counter 26, and the circumferencial direction counter 27, and is constituted.
[0012] The laser section 21 is equipped with the function which controls laser power by the data of the power control memory 25 which carried out ON/OFF of the laser with the data of the image memory 24 which let the pit width-of-face amendment section 22 pass, and let the pit width-of-face amendment section 22 pass. The pit width-of-face amendment section 22 makes the data (pulse width) time amount of image memory 24 and the power control memory 25 fluctuate based on the data stored in the pit width-of-face amendment memory 23. The radial counter 26 counts the spindle zero signal from the spindle control section 5, and controls each address of the pit width-of-face amendment memory 23, image memory 24, and the power control memory 25. The circumferencial direction counter 27 counts the spindle revolution signal from the spindle control section 6, and controls each address of the pit width-of-face amendment memory 23, image memory 24, and the power control memory 25. In addition, image memory 24, the power control memory 25, and the pit width-of-face amendment memory 23 shall deal with 12 bits (A0-A11) and data for the address as 8 bits (D0-D7).
[0013] Drawing 3 shows an example of a marking image and a marking result. Here, as an image stamped on an optical disk, "A" of the alphabet is illustrated and the marking result [according / right-hand side / to the optical head 7] according [the left-hand side of drawing 3] to a marking image is shown. Here, if a pit is made into different die length to an adjoining truck, the continuity of a shadow area is raised, and although the marking die length of a circumferencial direction is made to become the same by the marking image and the marking result, fine marking can be performed even if it is a binary expression. Moreover, if a circumferencial direction and radial pit length is fluctuated, zooming of a circumferencial direction is possible.
[0014] Next, with reference to drawing 1 - drawing 3 , actuation of the marking equipment for optical disks of this invention is explained. First, the data of the marking image shown in the left-hand side of drawing 3 and the data of exposure power and pit width-of-face amendment are edited with the graphic form editor 2. Although the information on each dot is specified on the graphic form editor 2, since the radial die length (the number of trucks) of a dot and the die length (the number of encoder pulses from the spindle control section 5) of a circumferencial direction can be specified, amplification and a cutback are easy. A controller 1 writes each data of the marking image edited by the graphic form editor 2, exposure power, and pit width-of-face amendment in each of the image memory 24 of the laser control section 3, the power control memory 25, and the pit width-of-face amendment memory 23. The addresses A0-A7 are made into the circumferencial direction address, the addresses A8-A11 are made into the radial address, and a marking image is assigned to the single address per 8 dots.
[0015] Moreover, a controller 1 sets the counter value for incrementing the radial address of image memory 24, the power control memory 25, and the pit width-of-face amendment memory 23 as the

radial counter 26. This counter value is set up based on the information on the radial die length (the number of trucks) of the dot edited by the graphic form editor 2. Furthermore, a controller 1 sets the counter value for incrementing the circumferencial direction address of image memory 24, the power control memory 25, and the pit width-of-face amendment memory 23 as the circumferencial direction counter 27. This counter value is set up based on the information on the die length (pulse number detected with the encoder 10) of the circumferencial direction edited by the graphic form editor 2.

[0016] Moreover, a controller 1 initializes each address of image memory 24, the power control memory 25, and the pit width-of-face amendment memory 23. And a controller 1 takes out a command to the stage control section 4 and the spindle control section 5, and a stage 6 is moved so that the optical head 7 may come on an exposure starting position. Subsequently, a spindle motor 9 is rotated and an optical disk 8 is rotated. Then, a controller 1 outputs an exposure initiation command to the stage control section 4 and the laser control section 3. A stage 6 is gradually moved to radial [of an optical disk 8] with progress of exposure.

[0017] The spindle control section 5 sends out what carried out multiplying of the angle-of-rotation zero pulse (henceforth Z pulse) of a spindle motor 9, and the output pulse of an encoder 10 (henceforth an P-pulse) to the laser control section 3 and the stage control section 4. The stage control section 4 controls a stage 6 based on the pulse from the spindle control section 5, and moves the optical head 7. Thereby, a track pitch is kept constant.

[0018] The radial counter 26 counts Z pulse sent from the spindle control section 5, and if it reaches the number of trucks (radial die length of 1 dot) beforehand set up by the controller 1, it will increment the radial address of image memory 24, the power control memory 25, and the pit width-of-face amendment memory 23. Moreover, the circumferencial direction counter 27 counts P pulse sent from the spindle control section 5, and if it reaches the number of encoder pulses (die length of 1 dot of a circumferencial direction) beforehand set up by the controller 1, it will increment the circumferencial direction address of image memory 24, the power control memory 25, and the pit width-of-face amendment memory 23. Thus, when the radial counter 26 and the circumferencial direction counter 27 operate, corresponding to the location of the optical head 7 on an optical disk 8, exact data are outputted to the pit width-of-face amendment section 22 from image memory 24, the power control memory 25, and the pit width-of-face amendment memory 23.

[0019] The pit width-of-face amendment section 22 adjusts the output data (time amount, pulse width) of image memory 24 and the power control memory 25 according to the output data from the pit width-of-face amendment memory 23. There is the approach of compounding the signal which delayed the original signal and the signal of the origin of this by the delay line etc. by the AND circuit or the OR circuit as one of the adjustment approach of that, and shortening the original signal, or lengthening. The laser section 21 carries out ON/OFF control of the laser oscillation according to the data from the image memory 24 which let the pit width-of-face amendment section 22 pass. Moreover, the laser section 21 adjusts laser power according to the output data of the power control memory 25 which let the pit width-of-face amendment section 22 pass. Marking with a shade is performed by accommodation of laser power.

[0020] (Gestalt of the 2nd operation) Drawing 4 shows the gestalt of other operations of the marking equipment for optical disks of this invention. In drawing 4 , since the same citation figure was used for the same thing with having been shown in drawing 1 , the explanation which overlaps below is omitted. In the marking equipment for optical disks of drawing 4 , the alphabetic data generation section 40 and the image data generation section 41 were formed in the controller 1, and the focal control section 42 is further formed in the laser control section 3 and juxtaposition. Thereby, relief of the burden of edit of the marking pattern by the graphic form editor 2 is in drawing. The alphabetic data generation section 40 generates the pattern of standard alphabetic data, such as an alphabetic character, and sends this out to the graphic form editor 2. Thereby, the burden of marking pattern edit is mitigated. Moreover, the image data generation section 41 changes the content of the standard image files, such as a bit map and an icon, into a marking pattern, and sends this out to the graphic form editor 2. Thereby, the burden of marking pattern edit is mitigated.

[0021] The focal control section 42 builds in the counter and memory which count the detection pulse of an encoder 10 like the laser control section 3. And it has the function to adjust the diameter of a spot of an exposure beam (laser beam) according to the location of the optical head 7 on an optical disk 8. When stamping the rough pattern which is not thereby not much fine, focal control is performed and the diameter of the beam spot is enlarged. What is necessary is just to enlarge a laser output, since the exposure power per unit area will become small, if the diameter of the beam spot is enlarged. For this reason, when stamping by carrying out two or more revolutions of the optical disk 8, the turnover number of a spindle motor 9 can be reduced and, thereby, compaction of the exposure time can be aimed at.

[0022]

[Effect of the Invention] According to the marking equipment for optical disks of this invention, a location radial [on the optical disk stamped by the optical head based on the revolution information outputted from an encoder] and the location of a circumferencial direction are computed as explained above. Since the laser control section which controls the output of said optical head according to a location radial [said] and the location of said circumferencial direction in addition to marking data was prepared Creation (processing) of the marking data based on hardware control is attained, since the burden of software is mitigated, working speed increases, and it becomes possible to make a pit small, and fine marking can be performed. Moreover, since it can carry out adjustable [of the die length of pit width of face], expanding-and-contracting marking to a circumferencial direction is attained. Furthermore, since the burden of software is mitigated by hardware control, functions, such as a user interface and an error monitor, can be strengthened.

[0023] Moreover, a shade can be expressed in marking by controlling exposure power in the output control of an optical head. Furthermore, by having the editor ability of a marking pattern, zooming of the pattern of not only an alphabetic character but arbitration can be carried out, and it can be stamped.

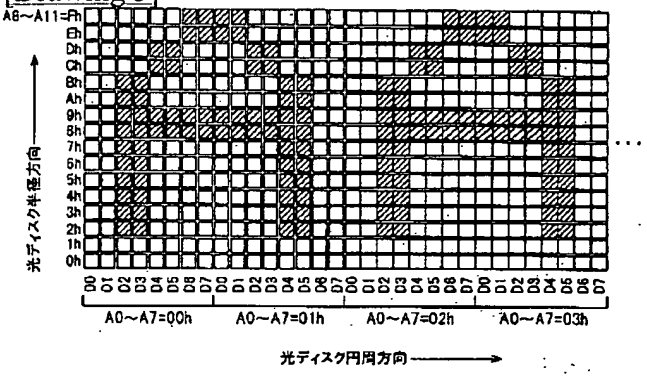
[Translation done.]

* NOTICES *

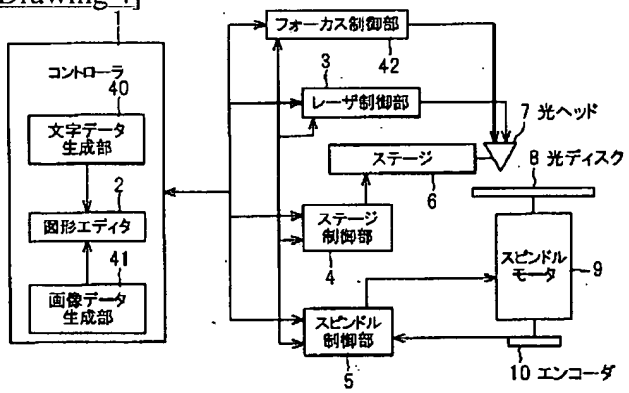
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

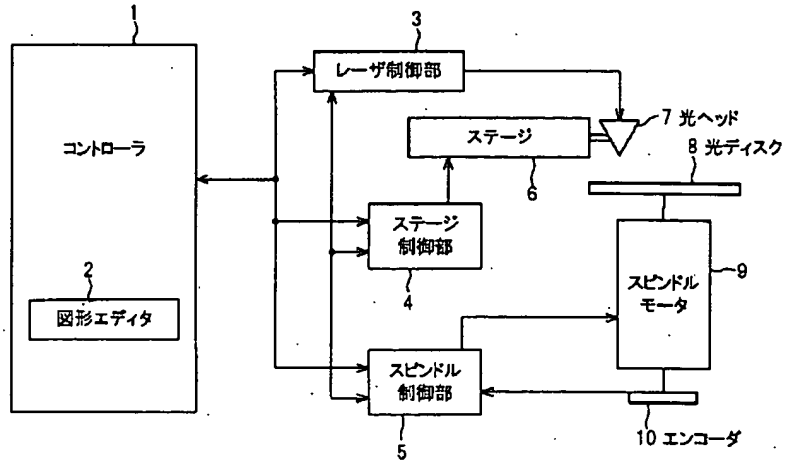
[Drawing 3]



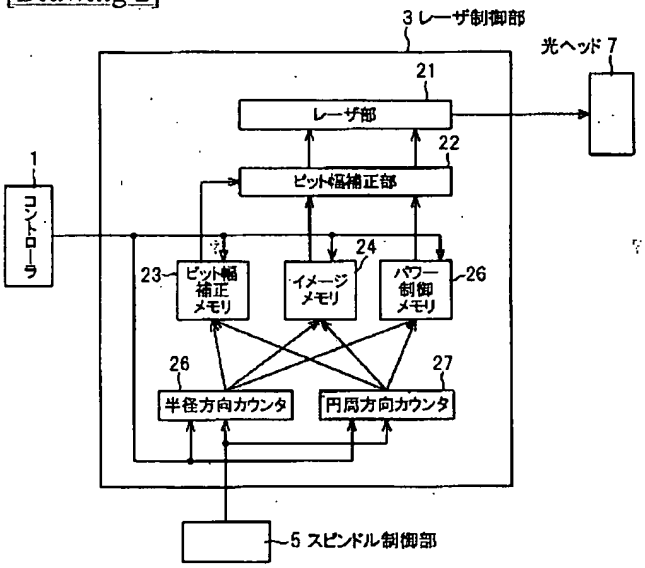
[Drawing 4]



[Drawing 1]



[Drawing 2]



[Translation done.]